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NANO-COMPOSITE MATERIALS AS EFFICIENT CATALYST FOR CO/CO_2 FIXATION REACTIONS USING OXALIC ACID AS C1 SUCRE

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Abstract. Transition metal catalyzed carbonylation reactions have become most sought-after technology for the utilization of toxic gases such as carbon monoxide and carbon dioxide. These gases are important C1 building block for the development of industrial core technology through the conversion of bulk and fine chemicals into useful compounds.[1] However, the direct use of these gases has been restricted because of their inherent toxicity, need of sophisticated reactors and careful handling of such instruments as the ppm level of gas leakage may cause serious problems. The introduction of solid CO-surrogates therefore highly desirable for the carbonylative transformation which must be safe to handle, stable at ambient temperature and cost effective.[2]

Last few years, our group has been dedicatedly involved for applications of oxalic acid as a bench stable C1 source for different challenging organic synthesis. First time, we have applied oxalic acid as a C1 source for carboxylation reaction of aryl halides, alkenylsilanes, and organoboronic acids.[3a] Further, we have applied oxalic acid as *in situ* or *ex situ* C1 source for different challenging reactions such as [2+2+1]-reductive cycloaddition reactions of terminal alkynes,[3b] carbonylative annulation of aryl halides to 2-aryl quinazolinones,[3c] aminocarbonylation of aryl halides with amines,[3d] synthesis of 3-substituted 2-quinolones,[3e] carbonylative Sonogashira reaction for α, β-alkynyl ketones,[3f] reductive carbonylation of nitroarenes to N-aryl formamides,[3g] semi-synthesis of pyrrolone-fused benzosuberenes,[3h] etc. Most of the reactions were performed under our developed Pd@PS, Rh@PS, Au@PS nano-catalytic conditions and further extended for Pd/C, homogeneous palladium and nickel catalytic conditions. Several recent reports on this work by some other groups also reflected the potential and vast applications of oxalic acid as C1 precursor.[4]

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Acknowledgement: *This work was supported by the Russian Foundation for Basic Research (grant # 19-53-55002)*